ectha *PRO*

Software Product

Version 1.0

User Manual

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Introduction

Introduction

DRC thanks you for choosing Ectha PRO

DRC Srl designs, manufactures and markets equipment for non-destructive testing and investigations in the field of civil engineering since 1978.

DRC Srl thanks you for choosing ECTHA PRO. The operating manual that follows has been designed to help you get maximum use from the ECTHA PRO rebound hammer. Read this manual with care before using the instrument and always keep it within reach during investigation phases. This user manual contains safety regulations as well as all instructions necessary for rebound hammer use and any subsequent processing of the data obtained. To take full advantage of instrument use, please read all instructions carefully.

This document is available in a follows format:

- o   Operating manual .pdf

- o   Operating manual .html

Both of them are available for download on Ectha PRO download area - www.drcitalia.it

Ectha PRO

Ectha PRO

ECTHA PRO concrete test hammer is a result of 30 years of mechanical manufacturer experience and unique Italian design.

Concrete test hammer ECTHA PRO is the evolution of standard hammer model "L" develop in cooperation with Università Politecnica della Marche - Ancona on 2003. Pubblication of research "MODIFICATIONS TO THE N CONCRETE HAMMER TESTER AND NEW CORRELATION CURVES BETWEEN THE HARDNESS INDEXES AND COMPRESSIVE MECHANICAL STRENGTH FOR NON-STRUCTURAL, COMMON HIGH STRENGTH CONCRETE. THE NEW FORMULATION OF THE COMBINED METHOD." is available on this page.

Equipped with Blue Tooth technology for the transmission of data in real time with the ECTHA R-APP application allows you to capture and display the values acquired either in the instrument in the paired device, record the test excel files, share files quickly and print the test report in the website through the portable Blue Tooth printer

General Safety

General safety

To prevent the risk of damaging the equipment or provoking damages to the operator or third parties, carefully read the following general safety standards prior to using the concrete test hammer. These standards should always be provided with the instrument, so that it may be consulted at any time by the user/operator. The manufacturer will not assume any responsibility for direct or indirect damages to persons, objects or domestic and non-domestic animals, due to the non-compliance of the safety standards contained in the present documentation.

!	The instrument must be used by adequately trained personnel, in order to avoid the improper use of the equipment.
!	The instrument must be solely used for its destined use for which it was designed
!	The tampering and modification of the instrument is to be considered as negligent and isolates the manufacturer from any responsibility deriving from the misuse. In such a situation the guarantee for eventual spare parts or calibration verification will immediately cease to exist
!	Do not perform or carry out any type of test with the instrument on any body part of person/s or animal/s: permanent damage and even grievous bodily harm may be caused by the use of the instrument on certain parts of the human/animal body
!	In the case of faults or malfunction, the instrument must only be repaired by qualified expert personnel. If, after dropping the instrument, the external plastic of the instrument breaks, remove the batteries and power cable and contact a DRC Customer Service Centre for the necessary repairs. Contact with the components inside the instrument may cause injury

	In the case of accidental breakage of the monitor, take care to not injure yourselves with the glass fragments and avoid contact of the liquid crystals with skin, eyes or mouth. The monitor is protected by break-proof plastic casing.
	Cable : In order to preserve the conformity of the instrument, use only the cables supplied for connection to the input/output terminals of the concrete test hammer, or cables sold separately by DRC

Aim and limits

Aim and limits

The tests that may be performed on hardened concrete in operation, normal and pre-compressed reinforced concrete, in order to control the quality and estimate the mechanical characteristics the tests are divided into destructive and non-destructive tests. The "mechanical" method for the determination of the surface hardness via the use of the concrete test hammer is among the non-destructive tests. This method is based on the corresponding existence between the unitary load for compression breakage and the surface hardness of the conglomerate, by measuring the remaining elastic energy (rebound method).

The concrete Test Hammer tests are used to estimate, with due limitations in the procedure, the compression resistance of the concrete in previously constructed structures. In fact the UNI EN 12504 -2:2001 at point 1, note 2, prescribes that the test method is not intended as an alternative for the determination of the resistance to compression of the concrete but, with an appropriate correlation, may provide an estimate of the resistance on site.

The Rebound index determined by this method may be used for the evaluation of the uniformity of the concrete on site, to delineate the zones or areas of poor quality or deteriorated concrete present in the structures.

Support

Support

For any trouble or assistance of DRC equipment, contact DRC Srl assistance service writing at
assistenza@drcitalia.it
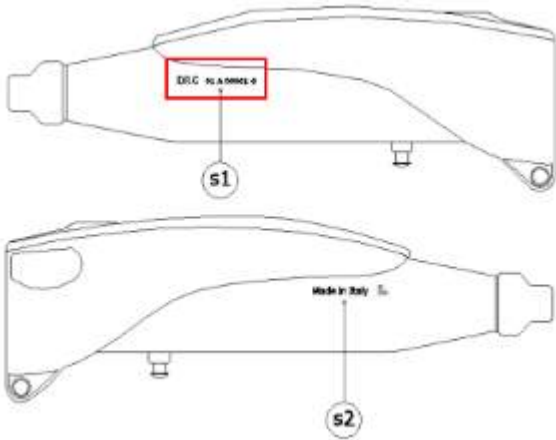Fill in **RMA Form** for any assistance or maintenance of Ectha Pro and enclose it with the equipment when send it back for repair or maintenance.
Send the document first by email and then enclose the document with equipment.
When you contact the DRC srl for maintenance issue, please use a follows data to identify the unit
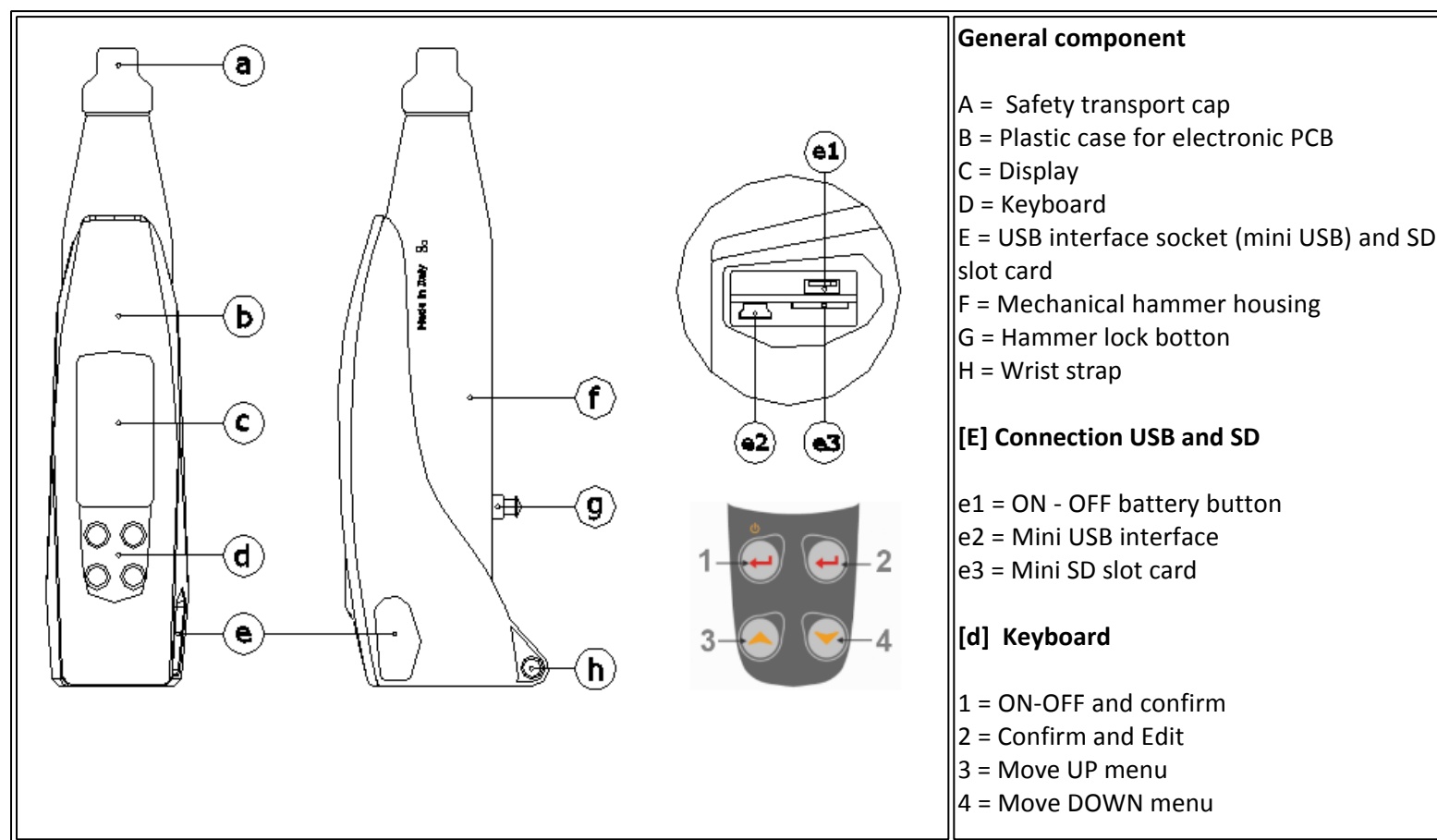
Modello strumento	Numero di serie	Data di calibrazione

Getting to know

Getting to know

Ectha PRO is made up of a mechanical model "N" rebound hammer with the electronics necessary for data acquisition, analysis and reporting. Below is a diagram of the Ectha PRO Digital rebound hammer and its main components.

General component

A = Safety transport cap
B = Plastic case for electronic PCB
C = Display
D = Keyboard
E = USB interface socket (mini USB) and SD slot card
F = Mechanical hammer housing
G = Hammer lock botton
H = Wrist strap

[E] Connection USB and SD

e1 = ON - OFF battery button
e2 = Mini USB interface
e3 = Mini SD slot card

[d] Keyboard

1 = ON-OFF and confirm
2 = Confirm and Edit
3 = Move UP menu
4 = Move DOWN menu

	3+4 = update firmware

Keyboard
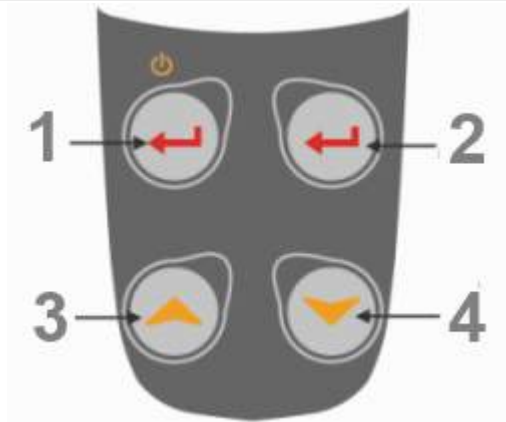
	Keyboard is made with 4 buttons through which can manage all functions of the instrument.
	w Key 1 : ON-OFF - Confirm selection w Key 2 : Confirm - Select w Key 3 : Move up menu w Key 4 : Move down menu

Safety transport cup

Safety transport cup

Concrete test hammer ECTHA PRO is delivered to the end user with the safety transport cup to prevent damage during trasport

Remove it before use the concrete test hammer. Do it following below instruction

If while you are removing safety cap the ring is removed as well, please follow the procedure showed on the video to restore the hammer as before.
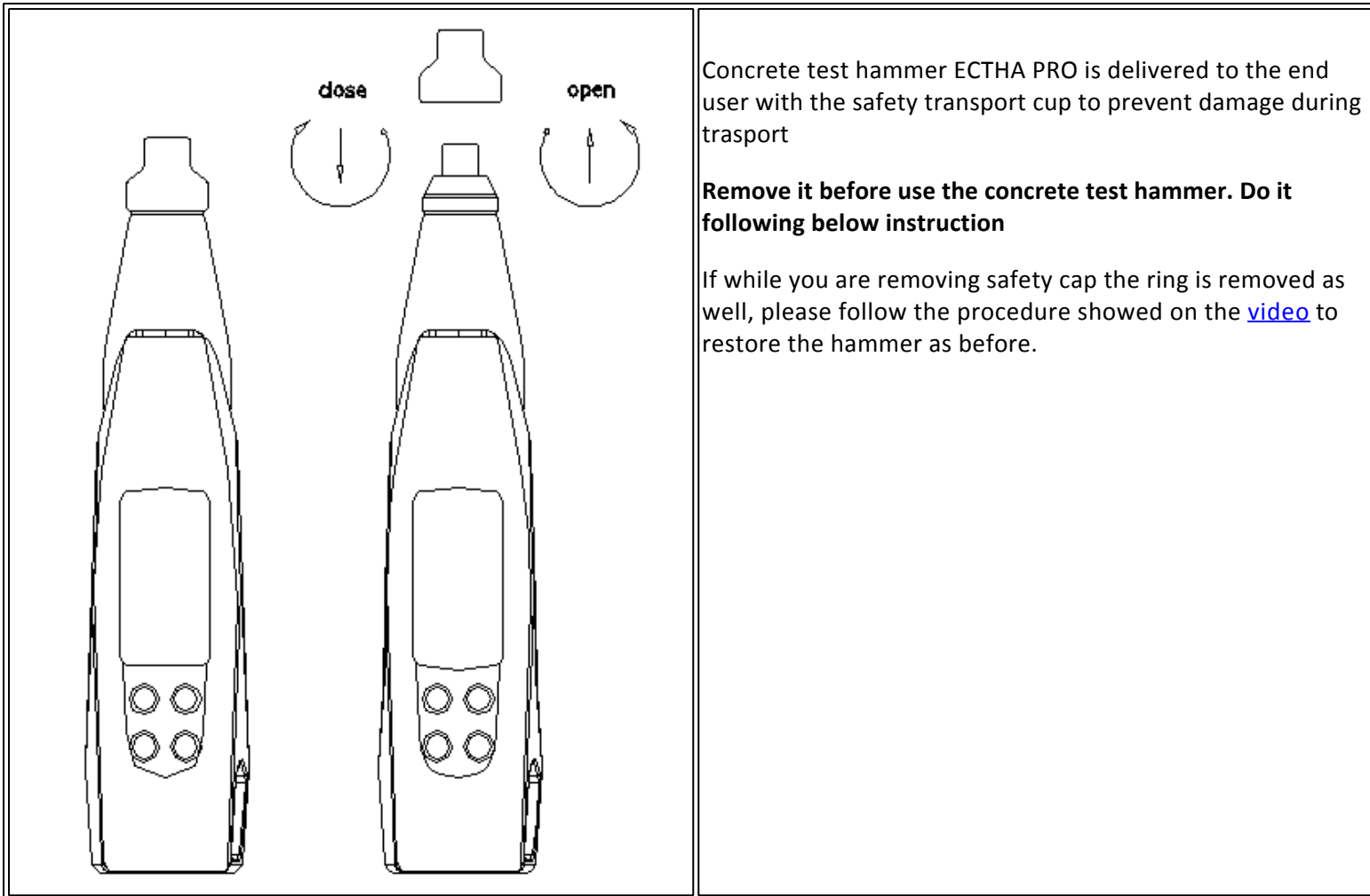
Performing Test

Performing Test

Below are the general procedures for the proper execution of the survey with the concrete test hammer.
Steps to follow:

o   Calibration check
o   Selection and preparation of the test surface
o   Performing test
o   Test result
o   Report

to get more info, see

Select and preparation of the test surface

The concrete elements to be subjected to the test must be at least 100mm in thickness and fixed inside a structure. Smaller sample pieces may be subjected to testing as long as these pieces are rigidly supported. Areas that contain the presences of gravel nests, flaking, course textures or other porous elements and in the proximity of significant inertia must be avoided. It should also be avoided, by performing a preliminary Rebar Locator investigation, the carrying out of sclerometric strikes in areas of passing armatures and in the vicinity of pre-compression cables and wires.
In the selection of an area to be subjected to the test the following factors should be considered:

o   Identification of the areas interested in the passage of armatures;
o   Type of surface
o   Status of the surface humidity
o   Carbonatation of concrete
o   Movement of the concrete during the test
o   Evaluation of the damage level of the surface subject to the test
o   Test direction
o   Other appropriate factors as, for example, the type of concrete and the declared resistance class
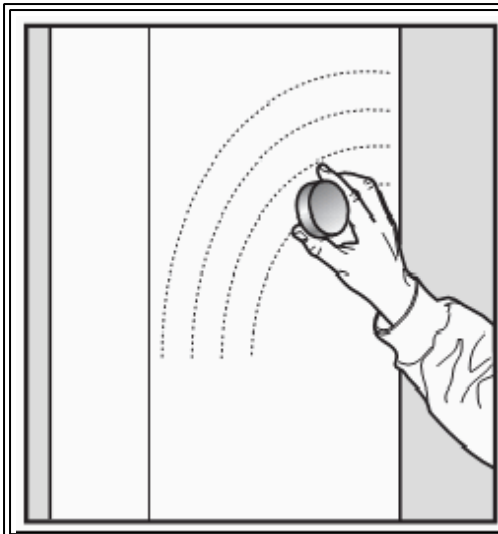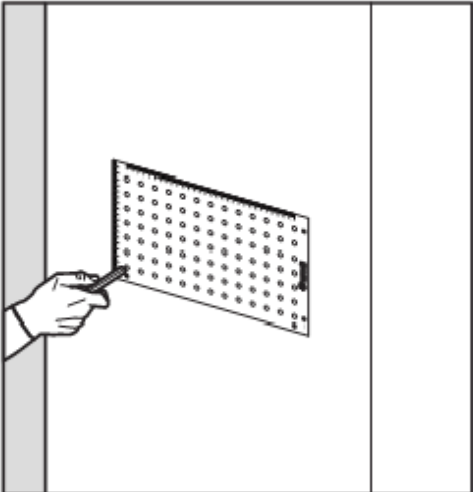
The area to be subjected to the test must be approximately 300 mm x 300 mm. Ensure that the distance between the two points of impact are not less than 25 mm and that neither is less than 25 mm from the edge.

The preparation of the test is carried out using an abrasive medium grain carborundum stone, provided with the instrument, to rectify the surfaces with rough or tender textures or surfaces with traces or mortar, in order to render the surfaces smooth.

The smooth or float surfaces may be subjected to testing without rectification. Remove eventual water residue present on the cement surface.

Do a test

Unscrew the safety cap upon removing the sclerometer from its covering, lightly push the percussion rod inwards, compressing it towards a rigid surface.

The rod will unhook and exit from the instrument body which is now ready for the test.

Operate the instrument at least three times prior to taking any readings, in order to ensure that the mechanics are operating correctly. In order to facilitate the testing an appropriate station-template supplied with the instrument permits the marking of a normal line grid, with lines distancing from 25 to 50 mm and the intersection of the lines as examination points, on the element subject to the test

Depress the percussion rod against the concrete surface under examination, maintaining the apparatus in perpendicular to the surface. Apply gradual to increasing pressure until the hammer unhooks. Maintain the apparatus firmly pressed against the examined surface, depress the halt pawl and read the value of the bounce index. Do not touch the halt bottom while pressing the percussion rod.

Prior to carrying out a sequence of tests it is best to perform a concrete test hammer calibration using the stainless steel anvil of reference and check that it conforms to the limits recommended by the manufacturer (the average bounce index of the concrete test hammer strikes performed with the ECTHA PRO and ECTHA 1000 to the calibration anvil must be 80 ± 2). On the contrary contact the DRC Srl assistance laboratories. The concrete test hammer should be used at a temperature between 10°C to 35°C. After the impact record the concrete test hammer rebound value

Do not touch the halt pawl while pressing the percussion rod.
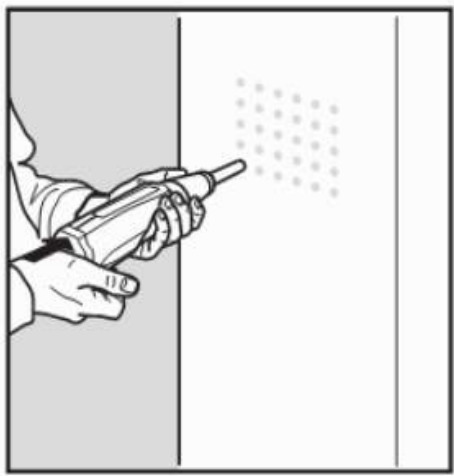
After the impact record the sclerometric index.

Employ a minimum of nine measures in order to obtain a reliable estimate of the sclerometric index of a test area. Record the position and the orientation of the sclerometer for each measurement.

Examine all the prints left on the surface after the impact and if the impact has shattered or perforated due to a gap near the surface, discard the result.

After the tests, re-perform the calibration check using the stainless steel anvil. Humidity, carbonatization alterations, chemical aggressions, micro-cracks, composition and history of the concrete, status of the scabrous surface and underlying mass object of the percussion, are all elements that influence the bounce index value.

The concrete altered by the carbonatization will cause an over-estimation of the resistance which in extreme cases may reach 50% (in effect the formation of calcium carbonate provokes a hardening of the surface strata).
The presence of the carbonatization may be ascertained via a colorimetric test. The test is normally carried out by spraying (using a sprinkler) on the lateral surface of the cylindrical micro-samples, extracted via coring the elements subject to the test, with a phenolphthalein solution at 1% of ethyl alcohol (supplied with the instrument). The solution undergoes a color change once it is sprinkled going from a transparent white to a red-violet color when the surface results as not carbonatated;
On the contrary where a surface is carbonatated the solution does not change remaining its transparent white color. It is possible to establish a correction factor of the readings obtained take into consideration the carbonatization phenomenon by comparing the sclerometric test results carried out on both the carbonatated surface and non-carbonatated below surface area.

Test Result

If over 20% of all the measures fluctuates from the average by more than 6 units, the entire set of measurements taken will have to be discarded (ECTHA-W software allow to do this test)

Report

The test report should include the following:

o   identification of the element / concrete structure
o   position of the test area/s
o   concrete test hammer identification;
o   description of the test area/s preparation;
o   concrete details and conditions;
o   date and hour of the test run;
o   test result (average value) and orientation of the sclerometer for each test area;
o   eventual deviations from the standardized test method;
o   declaration of the person responsible for the test, whom can attest that the 12504-2:2001 test has been performed, excepting that referred to in point (8).
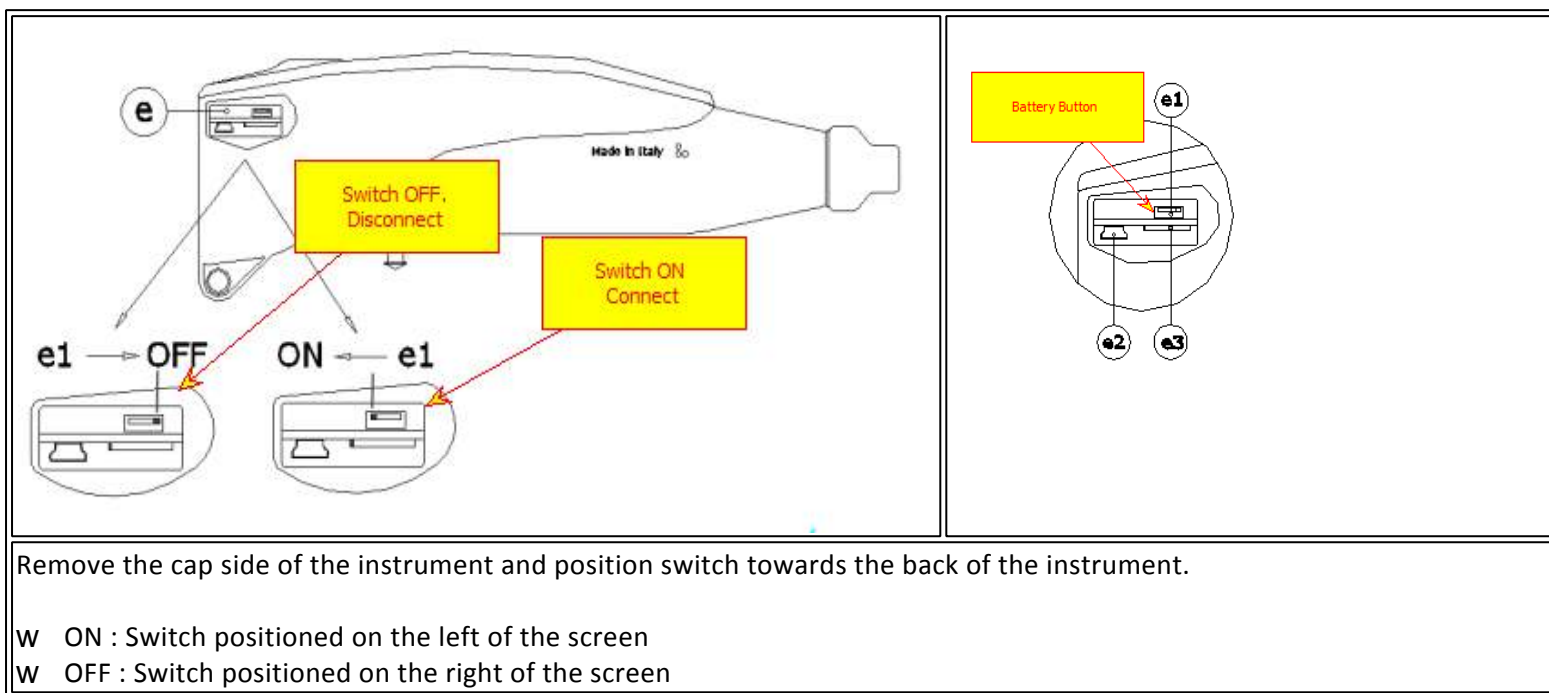
Where necessary, the report may also include the single concrete test hammer readings
download **ECTHA-W** free software to make a right report

Turn ON-OFF and battery

Turn ON-OFF and Battery

The instrument ECTHA Pro is made with a manual system that allows you to connect and disconnect the batteries (mechanically) from the instrument.
Switch is located under the cap USB interface and SD card ("e1")

With this option, you can safeguard your life and the "life" of the battery. It is advisable to disconnect the batteries for occasional use of the instrument. This makes it possible to prevent damage to the battery (under the memory level) and reduce those situations that you are not professional on-site with the instrument completely discharged.

Remove the cap side of the instrument and position switch towards the back of the instrument.

w   ON : Switch positioned on the left of the screen
w   OFF : Switch positioned on the right of the screen

⚠	Connecting the batteries, if not appear any writing on the display to put the instrument on charge by connecting the charger provided with the instrument.
⚠	We recommend that you disconnect the batteries at the end of each day's work. This procedure does not allow the batteries to degrade rapidly.
⚠	The operation of mechanical disconnection of the batteries means that all the parameters and settings can be lost. Next time you turn the instrument will need to set measurement parameters

Recharge Battery

Connect the USB cable supplied with the instrument in the Mini USB connector located under the cap interface (E)

⚠	Connect the battery before start recharge operation. Warning message will appear if battery is disconnected.

ECTHA PRO has a new power supply system which allows it to operate for over 10 hours continuously.
ECTHA PRO must be charged for at least 8 hours to ensure this performance.

⚠	🔋	**Keep under charge 8 hours to get better performance**

Switch OFF Echta PRO

The concrete test hammer ECTHA Pro can be turned off through a menu function described below or in the case of non-scheduled use of the instrument for a long period, we recommend disconnecting the batteries as indicated in the battery connection point **Stand-by mode** w Keep press button n.1 for 3 seconds to activate stand-by function. w Press the switch-on button for 2 second to activate the unit.	
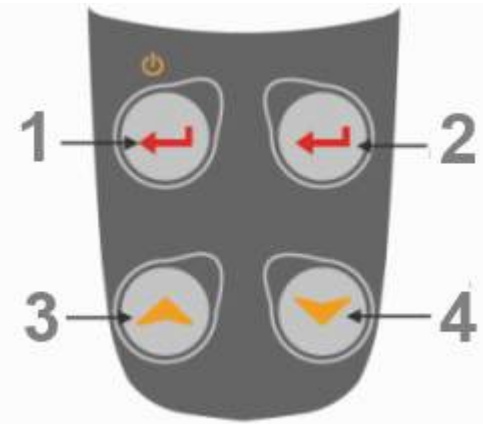
Menu

Menu

Concrete test hammer ECTHA Pro has new graphic menu interface:

Project Folder icon : Open a new investigation project or existing project

Measure icon : Instrument collect and show the measurement without recording the values. See also Ectha-R APP

Share icon : active USB interface for transfer files or Blue tooth mode

Setting icon : settlement of default measurement parameters
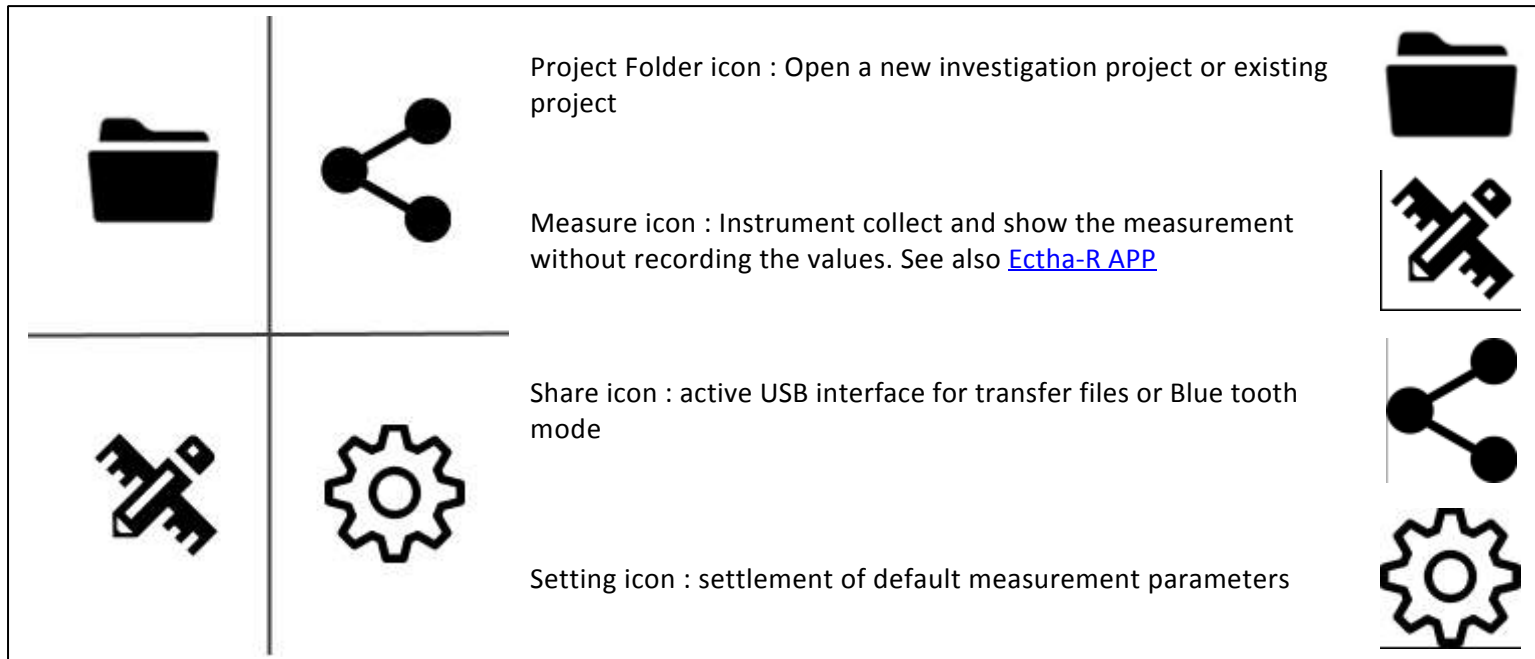
Project

Project

Use this menu to open a new work session – with recording of values – New Project – or to continue a project already started which needs to be completed –

Continue Project.
The measurements are acquired and recorded on the SD memory card in a .cvs file. The file is recorded with the measurement date and a progressive number.

New Project

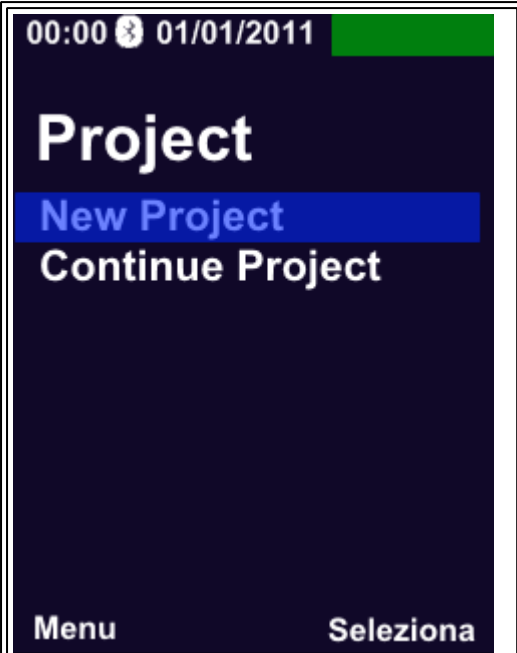|		
00:00 ◈ 01/01/2011 **Project** New Project Continue Project Menu Seleziona	00:00 ◈ 01/01/2011 **New Project** Project 1 01/01/2016 Angle 0 Start Exit Menu Seleziona	Select new project and confirm. Select right angle - orientation and press "start" to go on to main measurement screen and start to collect datas. All datas will be recorded on the mini SD memory card into the Ectha Pro unit or into external memory device if blue tooth connection is active. See Blue Tooth section - ECTHA-R app

Existing project

		Select "Existing projects" and confirm
00:00 🚫 01/01/2011	00:00 🚫 01/01/2011	All projects recorded will be show. Select and confirm the right one.
Project	**Load Project**	Project will start again from the point where it was closed.
New Project		.
Continue Project	W001 Date project	
Menu Seleziona	Menu Seleziona	
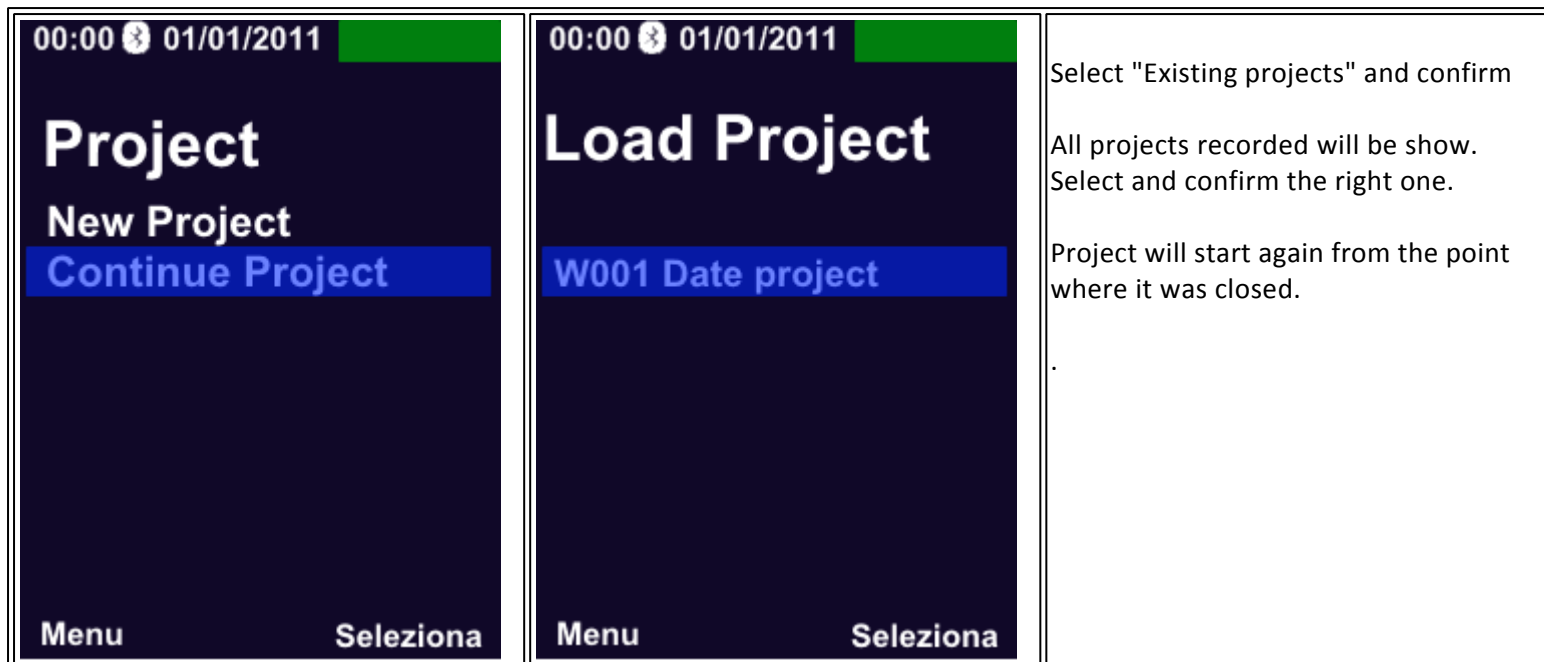
Measure

Measure

The hammer ECTHA Pro allows you to carry out the measurement of the rebound in two different settings.

- ○ Mode 1 : No data recorded on the internal unit memory
- ○ Mode 2 : data recorded on the internal memory

In both modes it's possibile to connect the concrete test hammer with ECTHA-R app device and record, organize, analyze and print data

Mode 01 - Measure without record data

Its' possibile to see index value, the average, RcK estimated value without record data in instrument memory.
The measuring fencing displays the following information:

A : Measure number
B : Hammer position : green ready to hit and acquire data
C : Rebound index
D : Rebound average index
E : Impact orientation value
E : Impact orientation icon
F: Number of tests acquired to make average

Menu : Open Menu page
Function : Open setting page for measurement
To connect the unit with ECTHA-R APP you must turn on the Blue Tooth function; see share section

|		
00:00 🅑 01/01/2011 ▬▬ **Measure 001** 🟢 **IRb: 00** **IRbm: 00** Angolo:00 ➡️❘ Xn: 0000 Menu Funzioni	00:00 🅑 01/01/2011 **Function** **New Project** **Select angle** **Delate last measure** **Back** **Enter**	Select function button: Now is possibile to: a. Open a new project b. Change orientation impact angle c. Erase last measure Select command line requested with arrow button. Confirm with Enter line desired
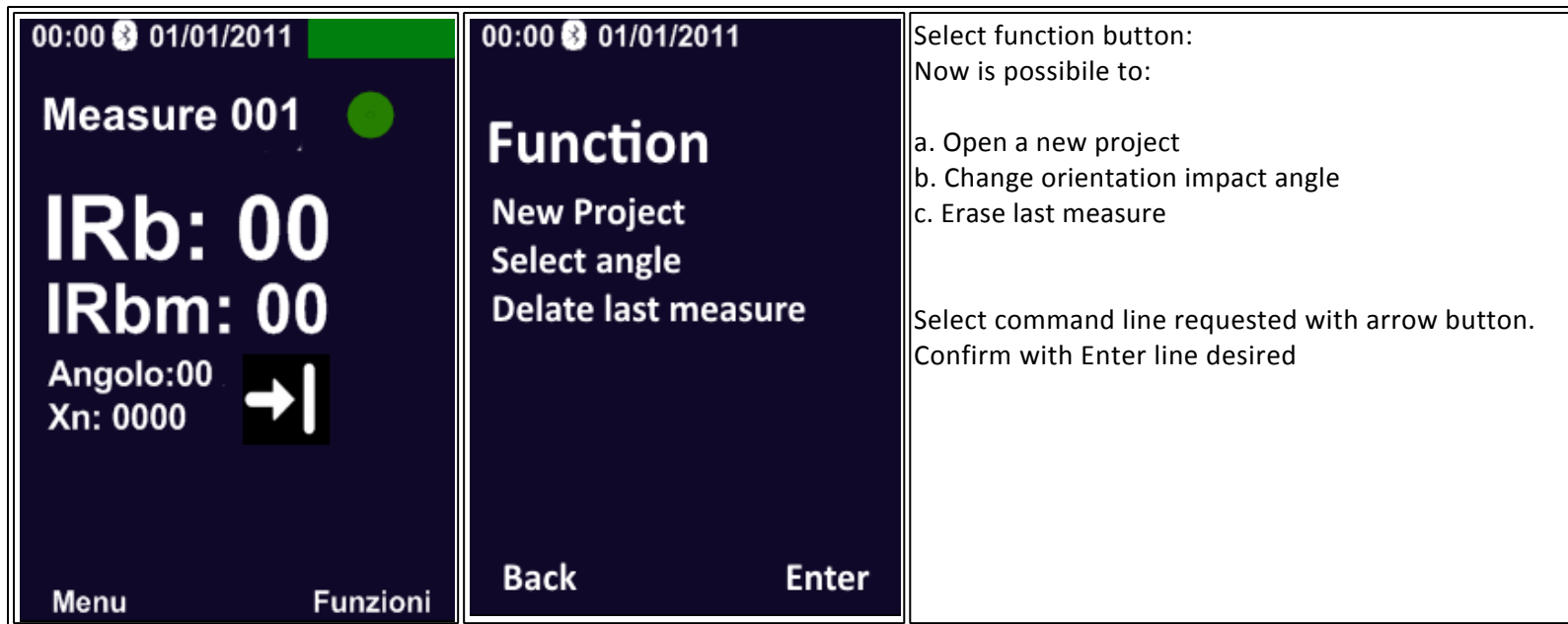
Mode 2 : Measure - Project

Record mode acquire and record data in a project.
New project could be open from main page (Project icon) or selecting "function command" - New Project (see above section)
Follow next steps to open a new project:
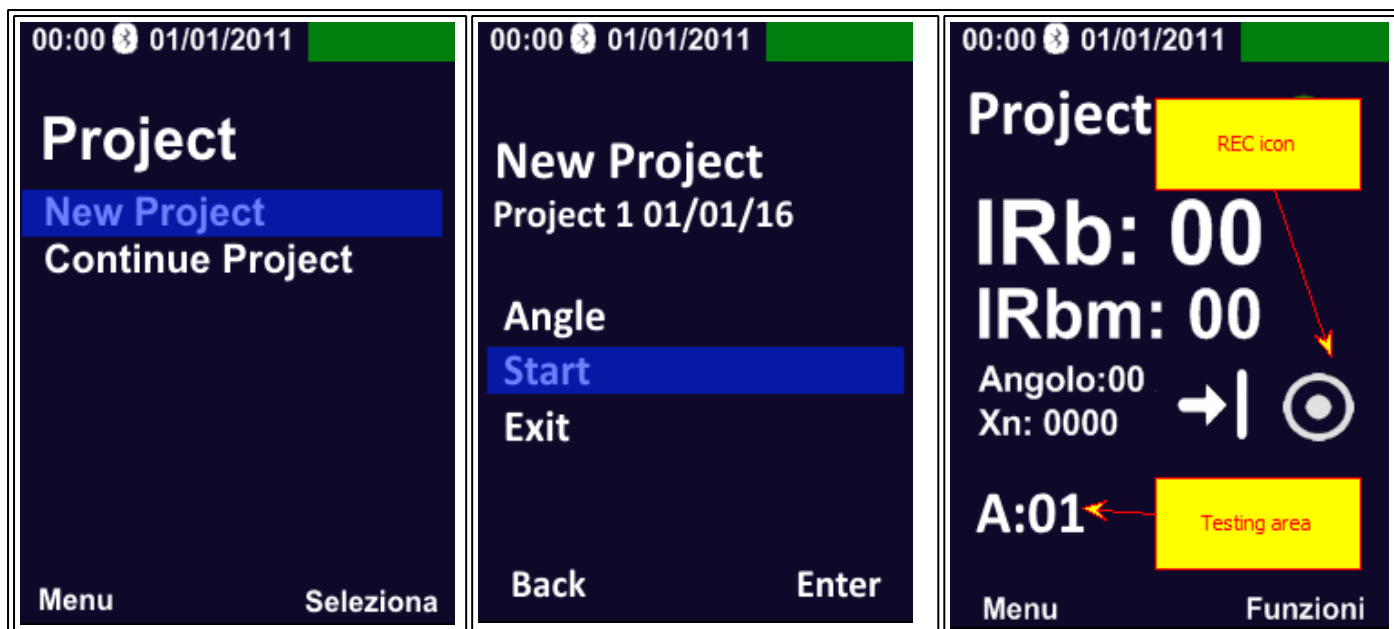
Main screen occur recorded icon active and testing area name (A: 01).
It's possible to manage infinite testing area in the same project.

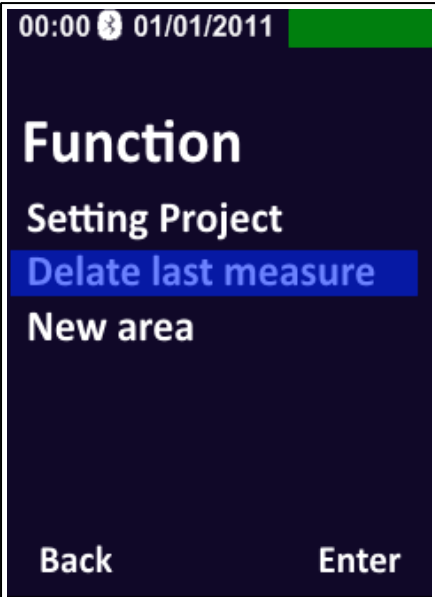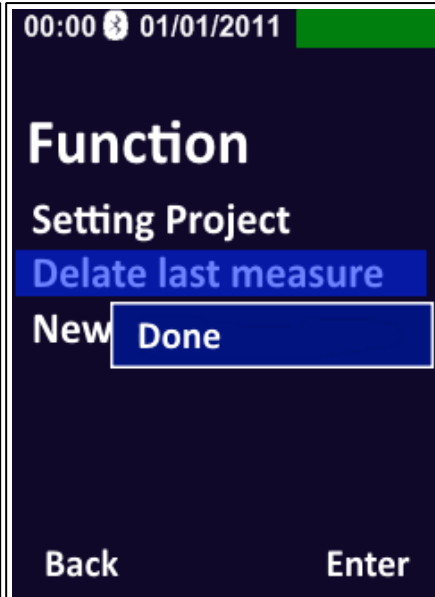Use Function feature to set all measurement parameters or change testing area.

Function - Edit

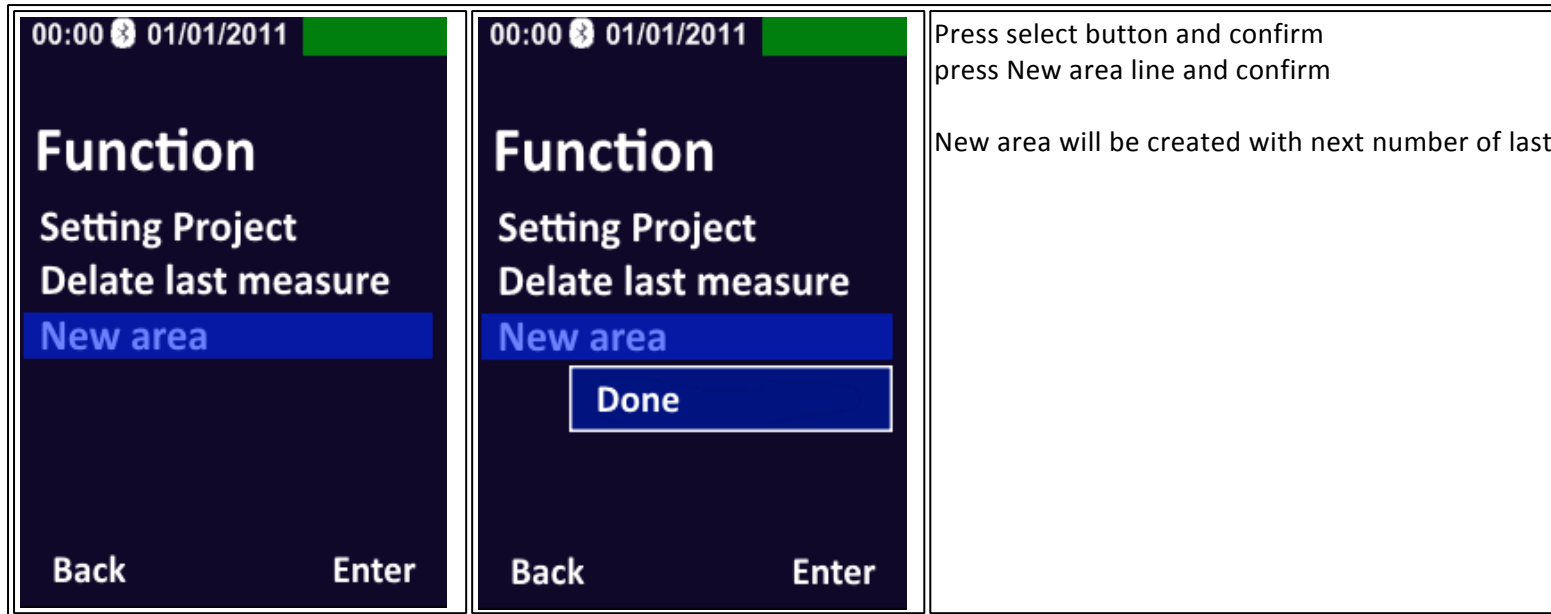Through the control functions present in the main measuring screen you can change the recording settings, as follows:

Select and change impact angle

00:00 🔵 01/01/2011 **Function** **Setting Project** Delate last measure New area Back Enter	00:00 🔵 01/01/2011 **Edit project** **Angle 90** Continue Exit Back Enter	Select and press Function: Select " Setting project" and confirm; Select "angle" line and change value with arrow button. Press back or Enter to go back the previous page.

Delate last measure

00:00 🚀 01/01/2011 **Function** Setting Project Delate last measure New area Back Enter	00:00 🚀 01/01/2011 **Function** Setting Project Delate last measure New Done Back Enter	Press Select and confirm Press "Delete last measure" and press enter to confirm. Ectha PRO will show message "done" to confirm the operation. Press back to go back on previous page

Open New testing Area

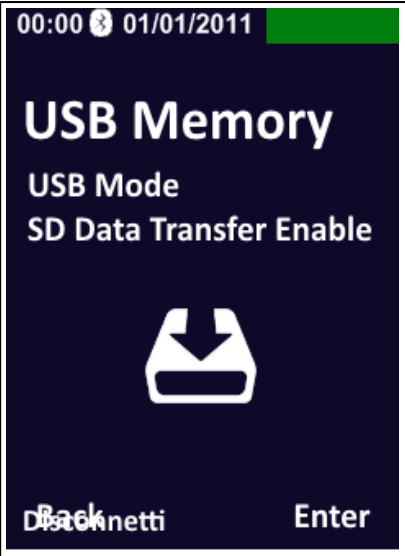| 00:00 ☗ 01/01/2011 | 00:00 ☗ 01/01/2011 | Press select button and confirm |
Function	Function	press New area line and confirm
Setting Project	Setting Project	New area will be created with next number of last.
Delate last measure	Delate last measure	
New area	New area	
	Done	
Back Enter	Back Enter	

Save Project

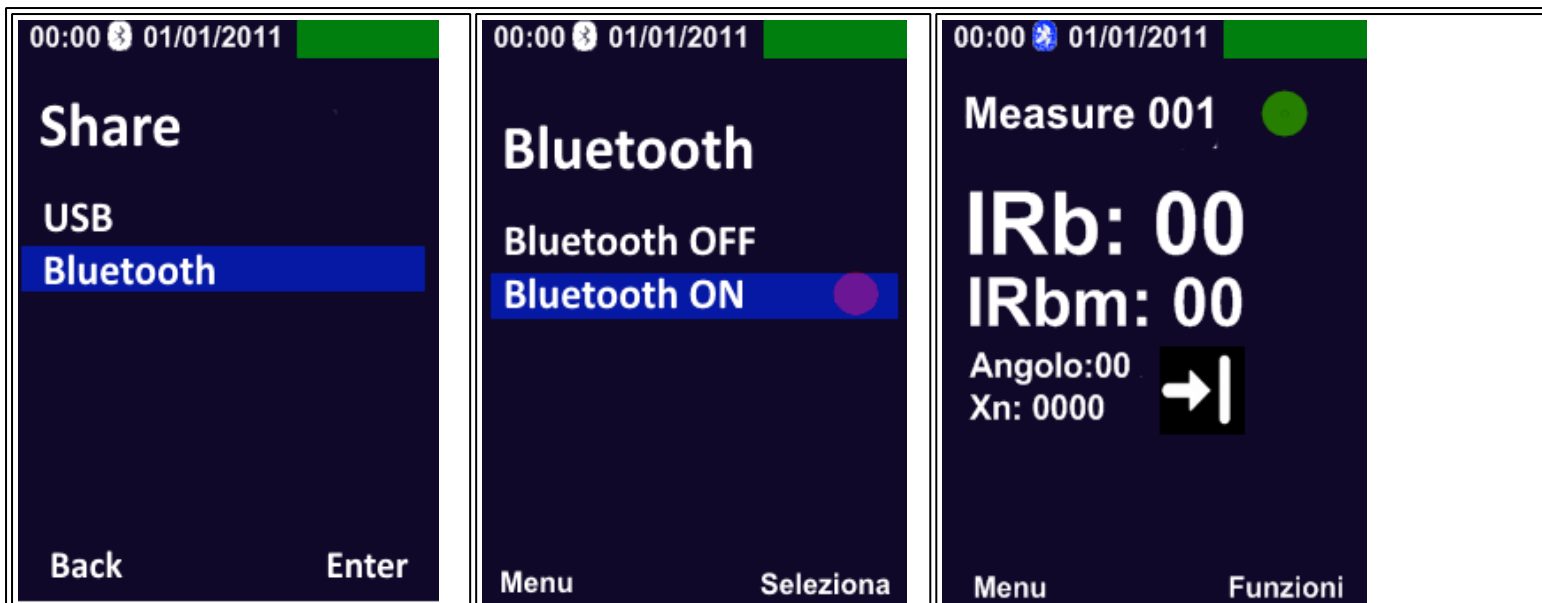Project will be saved automatically after operator get first hit - rebound value.

Share

Share

In this section is possibile to share you files and data with other device and turn on the Blue Tooth function.

USB interface

00:00 01/01/2011 **Share** **USB** **Bluetooth** **Back** **Enter**	00:00 01/01/2011 **USB Memory** USB Mode SD Data Transfer Enable **Back**netti **Enter** Disconnetti	Select from main manu "share" icon. Select USB line menu and confirm. PC or notebook will recognize automatically the device and external memory unit. Select files, copy and past on your computer.

Blue Tooth

00:00 🛇 01/01/2011 ▮▮	00:00 🛇 01/01/2011 ▮▮	00:00 🛇 01/01/2011 ▮▮
Share USB **Bluetooth**	**Bluetooth** Bluetooth OFF **Bluetooth ON** ●	Measure 001 ● **IRb: 00** **IRbm: 00** Angolo:00 Xn: 0000 ➡❘
Back Enter	Menu Seleziona	Menu Funzioni

Select from main menu, share icon.
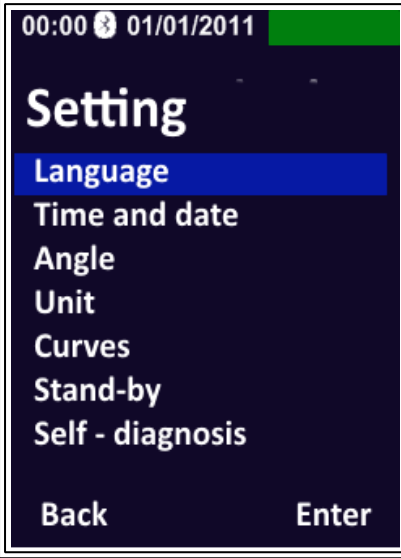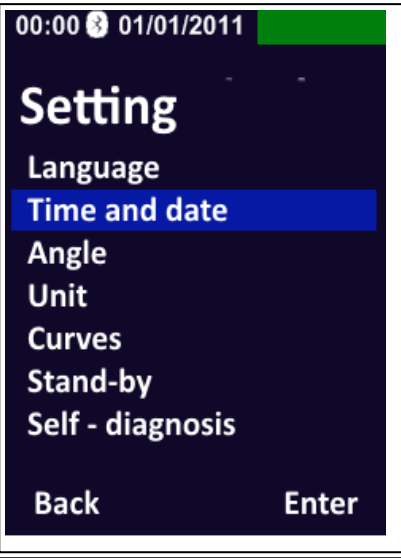
Select Blue Tooth line menu and confirm. Active the Blue Tooth function. Now the concrete test hammer ECTHA Pro is ready to send and receive data. See ECTHA-R section to get more info.

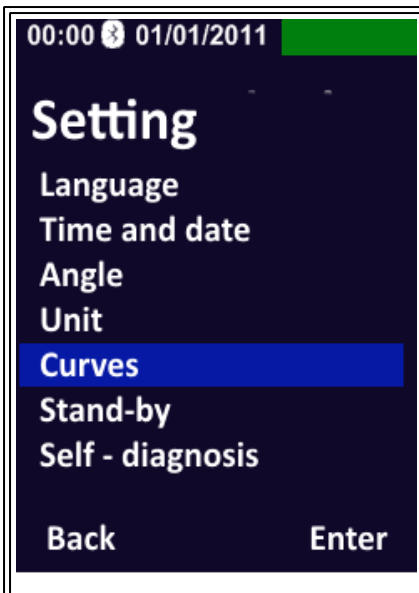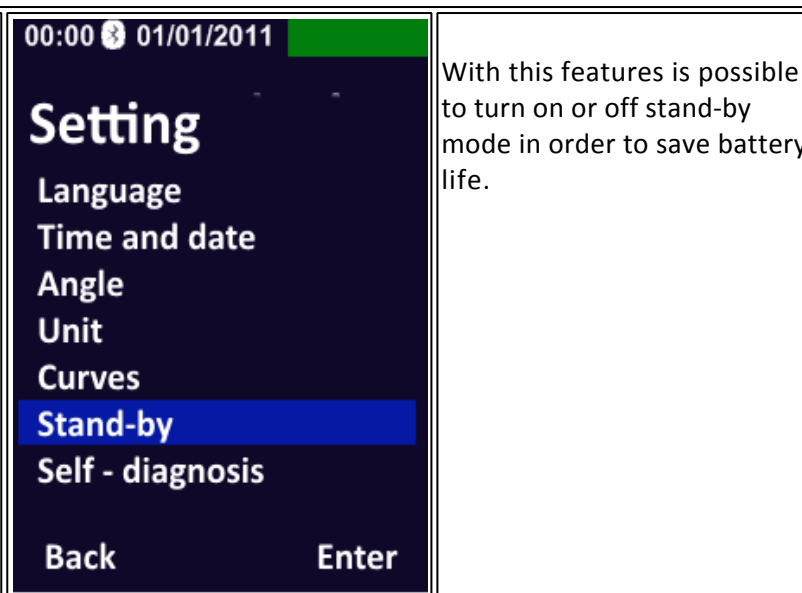|		
⚠	When the BT icon is ON and the unit is associated with external device and with ECTHA-R app the ECTHA Pro will send rebound index value, angle and area setting parameter. It's possible to misalignment ECTHA Pro with the ECTHA-R device in any moment.	❊
⚠	When the BT icon is ON and the unit is associated with external device time and date could be update automatically	❊

Setting

Setting

1. Language	**2. Date and time**	**3. Angle**	**4. Unit measurement**
5. Curves	**6. Stand-by**	**7. Diagnostic**	
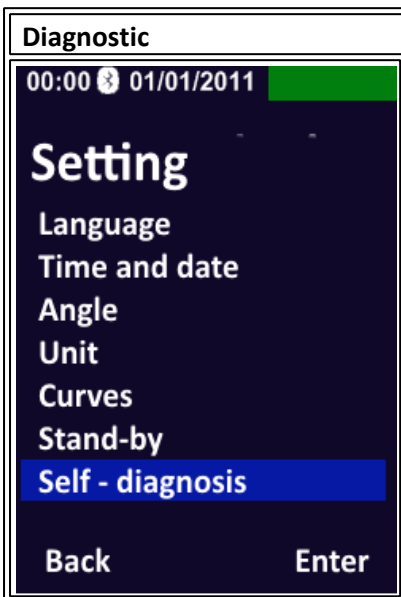
Language		**Date and time**	
00:00 🔵 01/01/2011 **Setting** **Language** **Time and date** **Angle** **Unit** **Curves** **Stand-by** **Self - diagnosis** **Back** **Enter**	Select Language line command and Confirm. Select right language and confirm with enter.	00:00 🔵 01/01/2011 **Setting** **Language** **Time and date** **Angle** **Unit** **Curves** **Stand-by** **Self - diagnosis** **Back** **Enter**	Select Time and date line command. Set paramenters and confirm.

Angle	**Unit measurement**

00:00 01/01/2011 **Setting** Language Time and date **Angle** Unit Curves Stand-by Self - diagnosis **Back** **Enter**	Select the Angle line command and confirm. The parameter set will became default parameter. W Angle + 90° W Angle 00° W Angle - 90° Select the angle and confirm
00:00 01/01/2011 **Setting** Language Time and date Angle **Unit** Curves Stand-by Self - diagnosis **Back** **Enter**	Select Unit and choose right unit measurement or select "Show or hide" . W MpA W PSI W Show or Hide.

Curves	**Stand-by**

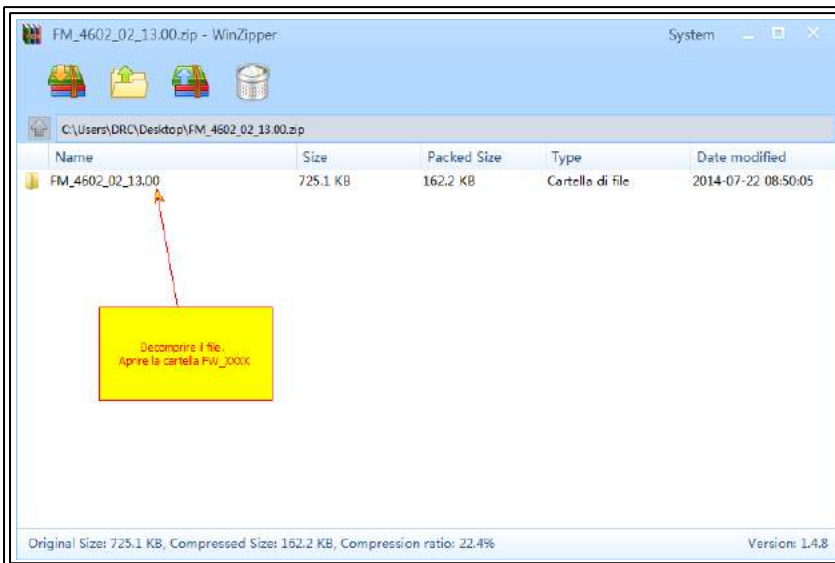|	
00:00 ⊗ **01/01/2011** ▮ **Setting** Language Time and date Angle Unit **Curves** Stand-by Self - diagnosis Back Enter	Select curves line command to select the right correlation curves. Confirm with enter
00:00 ⊗ **01/01/2011** ▮ **Setting** Language Time and date Angle Unit Curves **Stand-by** Self - diagnosis Back Enter	With this features is possible to turn on or off stand-by mode in order to save battery life.

Diagnostic

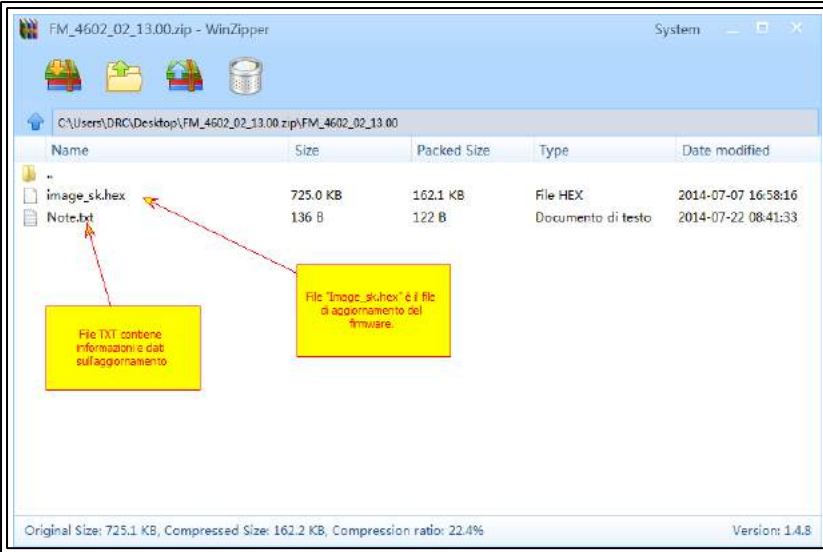|	
00:00 ⊗ **01/01/2011** ▮ **Setting** Language Time and date Angle Unit Curves Stand-by **Self - diagnosis** Back Enter	With this command is possible to make an internal diagnostic operation. Select the command line and confirm. At the end of "analysis" a txt report document will be generated. Share that document with DRC service office to active support and assistance.

Update and restore

Firmware up-Date

The DRC Srl releases new versions of the firmware of the instrument with technical updates and improvements.
Download the last version of firmware and update the instrument as follows instruction www.drcitalia.it/en
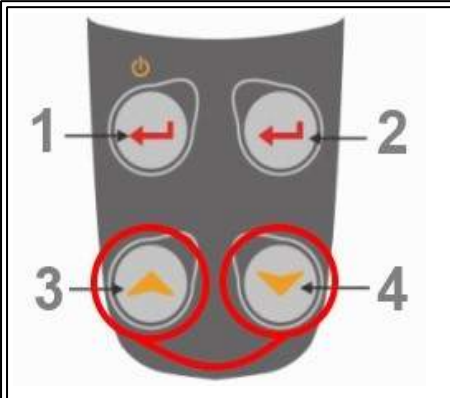
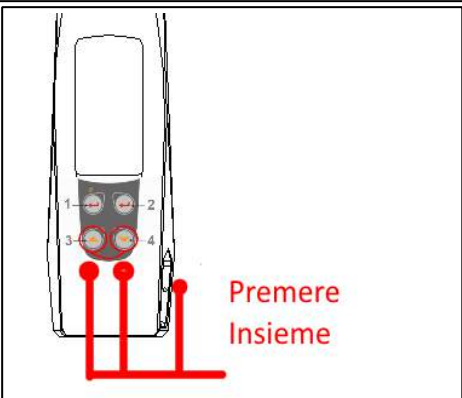|	
	Download the zipped file "Firmware ECTHA Plus Pro V.XXXXX" from 'Download Area" - ECTHA PRO PLUS. Unzip the file. Inside you will find the files. HEX file and a. TXT Copy both files to the SD card.

The new file must be copied to the folder with the same name. Use Copy and Replace windows function.

Turn ON the instrument, connecting the batteries, holding down both buttons simultaneously Arrow keyboard [3-4]. The firmware update process will be activated. The instrument display shows white screen intermittently. When the update tool reactivates functions with the new firmware.

| Keyboard bottom [3-4] | Turn ON battery and press together 3-4 | |

Restore

If the device doesn't work before to send it back to DRC service office, reload the unit with the mini SD back up board included on the device package. Change the mini SD and reload the unit.
Before you do this, copy all the saved data of the investigations carried out.

Share

Share

Thanks Blue Tooth technology the new ECTHA Pro broadens its possibility to share data acquired with other device.

It's possible to transfer data to PC or laptop by USB interface or with external mini SD card, connect the hammer with Android applicationECTHA-R using the full capabilities of an external device, print the values acquired directly to the site through the use of a portable Blue Tooth printer.

Blue Tooth

Il nuovo sclerometro ECTHA PRO provvisto di dispositivo Blue Tooth 4.0 e comunica in tempo reale con la nuova versione della APP ECTHA-R .

Grazie a questa funzione ECTHA PRO acquisisce i valori indice di rimbalzo inviandoli alla APP ECTHA – R, che li visualizza e registra, esegue una prima analisi dei valori, acquisisce immagini da associare all'area di prova e, se disponibile la stampante Blue Tooth, dà la possibilità di stampare un report sintetico dei valori in sito.

Ectha PRO Vs ECTHA-R

Ad accensione dello strumento il sistema Blue Tooth si attiva in modo automatico.

Attivando il sistema di comunicazione del dispositivo che si intende associare, questo viene immediatamente riconosciuto. Il nome che appare nel dispositivo Android è ECTHA-PRO seguito da un numero identificativo.

Lo sclerometro ECTHA PRO una volta associato al dispositivo imposta ora e data in modo automatico ed in modo allineato con il dispositivo.

La visualizzazione dei dati indice di rimbalzo nel dispositivo Android è possibile solo con l'applicazione ECTHA-R che deve essere installata nel dispositivo android.

Per maggiori chiarimenti sul funzionamento della APP ECTHA-R visita la pagina del prodotto

Stampa
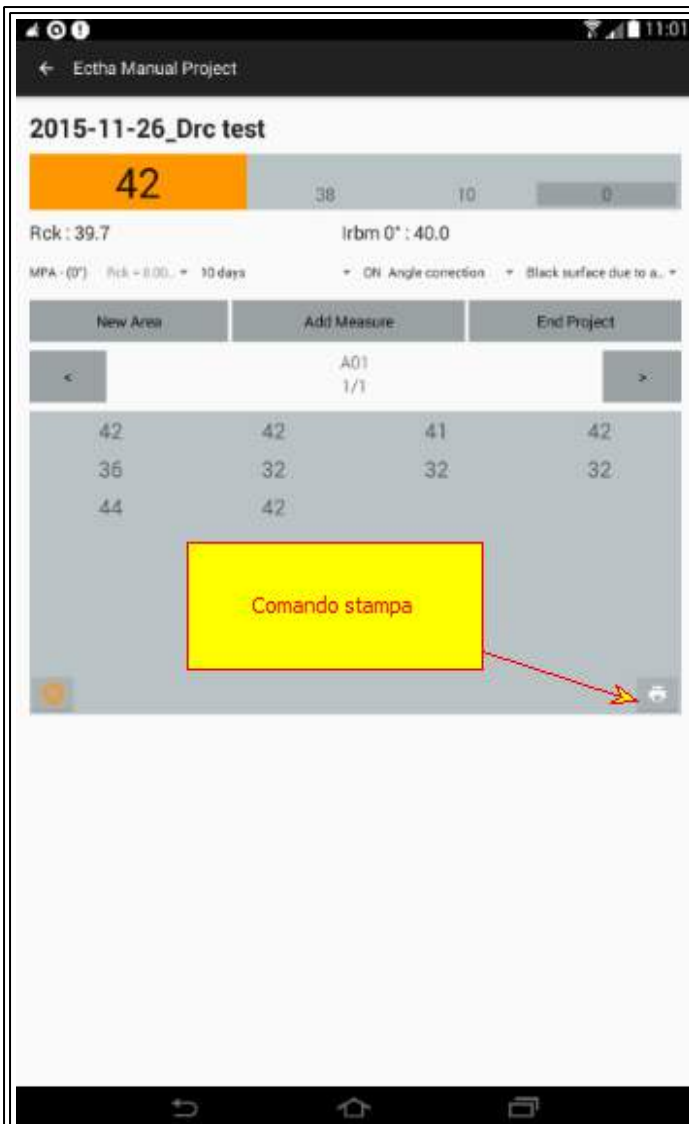
La nuova versione della APP – ECTHA-R permette di visualizzare i valori acquisiti in tempo reale, analizzare i dati, catturare una immagine dell'area di misura, stampare i valori di ogni singola area di prova attraverso la stampante Blue Tooth (accessorio opzionale).

Per procedere con la stampa è necessario configurare la stampante con il dispositivo android attraverso il menu "impostazioni" del dispositivo.

Eseguire l'associazione con la stampante.

Vedi manuale ECTHA-R

Software ECTHA-W
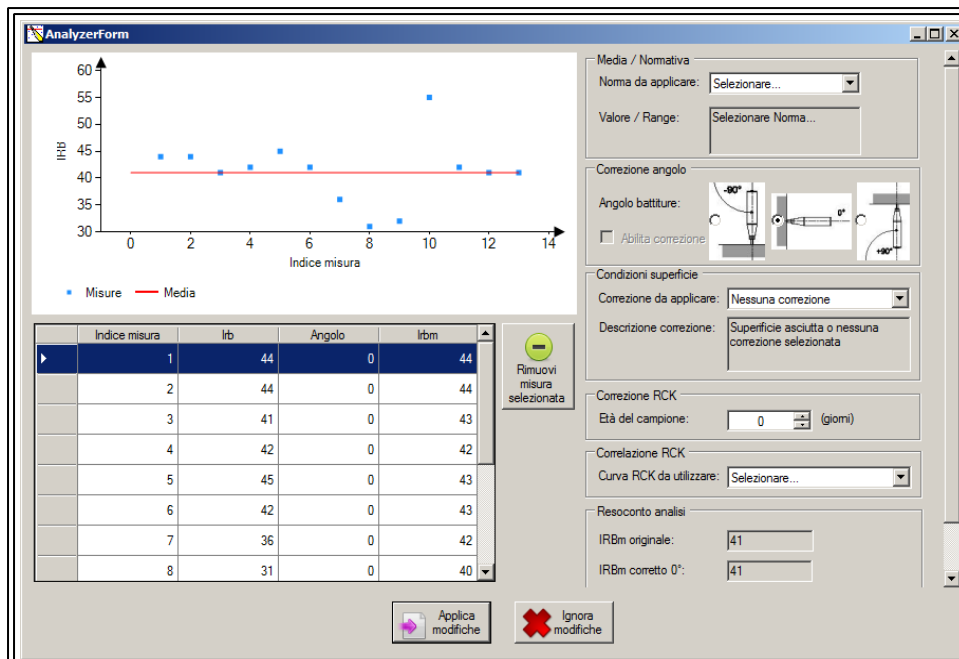
Il software ECTHA-W è una applicazione windows che consente di analizzare i dati acquisiti con lo sclerometro Ectha Pro e/o con l'applicazione ECTHA-R e compilare un report personalizzato.

Il software viene fornito con lo sclerometro elettronico, altrimenti è possibile scaricare il file di installazione dal sito www.drcitalia.it nella sezione areadownload
Per maggiori informazioni consultare la sezione ECTHA-W

Calibration

Calibration

Insert the tool into the plastic guide and run a series of hit with the hammer (at least Xn = 10);
At the end of the test series, calculate the average value and check if it is within the tolerance range specified on the anvil (80 ± 3)

If the calibration check falls outside the tolerance DRC contact support.
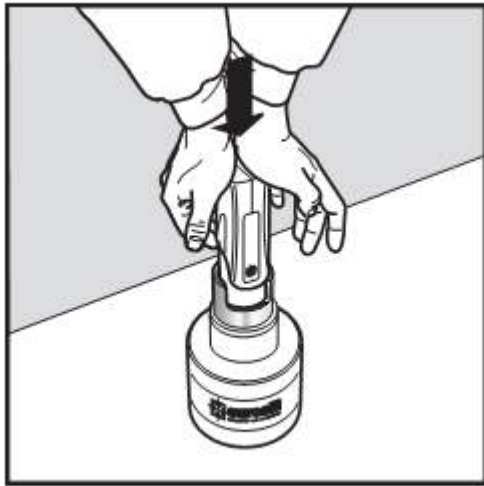
<table>
<tr><td></td><td>

Testing Anvil

The stainless steel calibration anvil TAM100 for the sclerometer verification is characterized by a hardness of 57.60 HRC (Rockwell Hardness type C), by a mass of 16 kg and a diameter of about 150mm. The verification of the calibration of an anvil does not guarantee that diverse sclerometers will produce the same results in other points of the sclerometric scale. In order to verify the calibration of the sclerometer, the stainless steel anvil must be placed on a rigid surface.
Operate the instrument at least three times prior to initiating the readings from the calibration anvil, to ensure that the mechanics are operating correctly.
Then, following this procedure, insert the sclerometer in the anvil guide ring and carry out a series of strikes (no. = 10).
The average bounce index of the sclerometric strikes performed with the sclerometer ECTHA1000 to the calibration anvil TAM100 must be 80 ± 3.

</td></tr>
</table>

Standards

Standards

Concrete Test hammer ECTHA Pro and Testing Anvil calibration TAM100, made from the DRC have been constructed in conformity of follows standards

o   StandardISO/DIS 8045
o   EN 12 504-2
o   ENV 206
o   DIN 1048 parte 2
o   BS 1881 parte 202
o   ASTM C 805
o   NFP 18-417
o   B 15-225
o   JGJ/T 23-2001
o   JJG 817-1993

Curves

Correlation Curves

The correlation curves that follow provide an estimate of the compressive strength of the concrete. The curves are the results from experiments carried out by the DRC Srl with the Polytechnic University of Marche (download area - concrete with characteristics of central Italy.
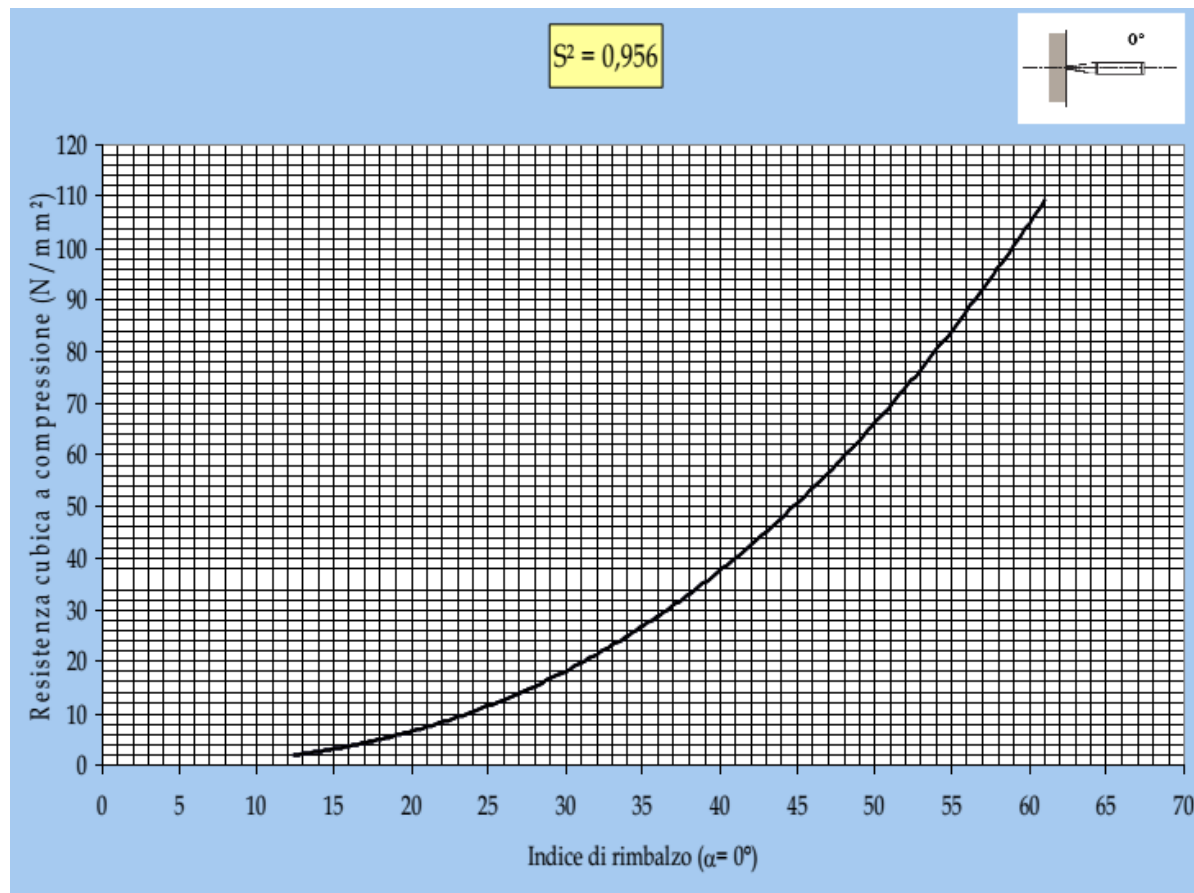The curves are indicative and are used to estimate the compressive strength.
To determine the compressive strength is necessary to calibrate the hammer with the direct evidence and realize the correlation curves of the material.
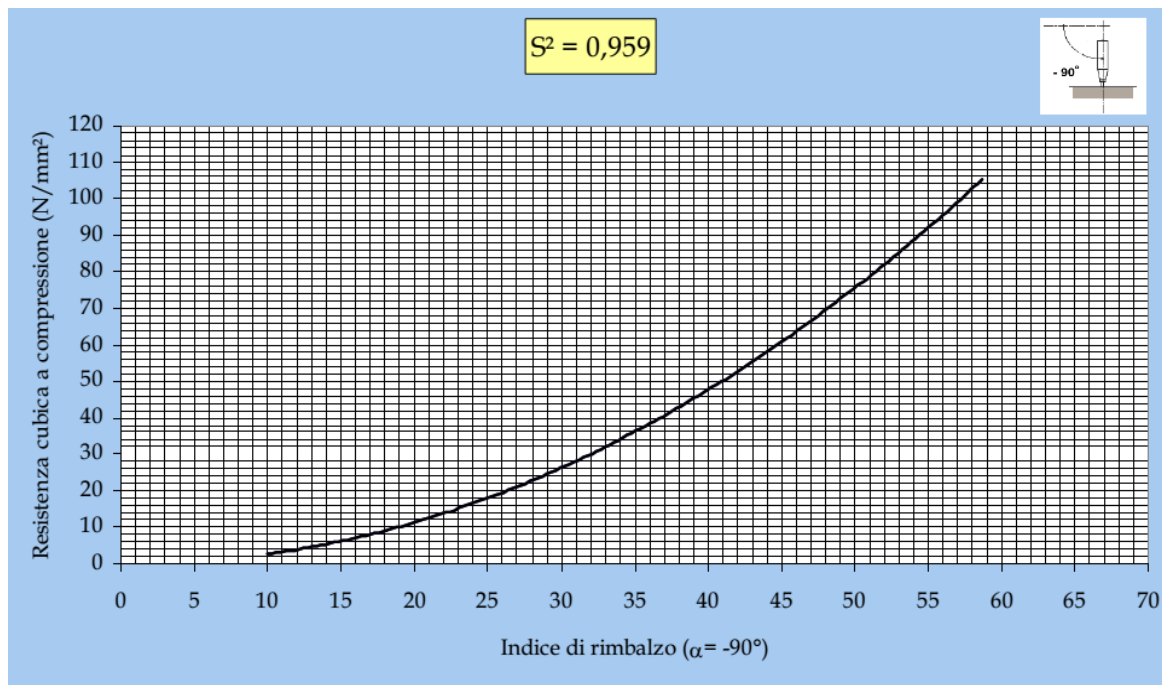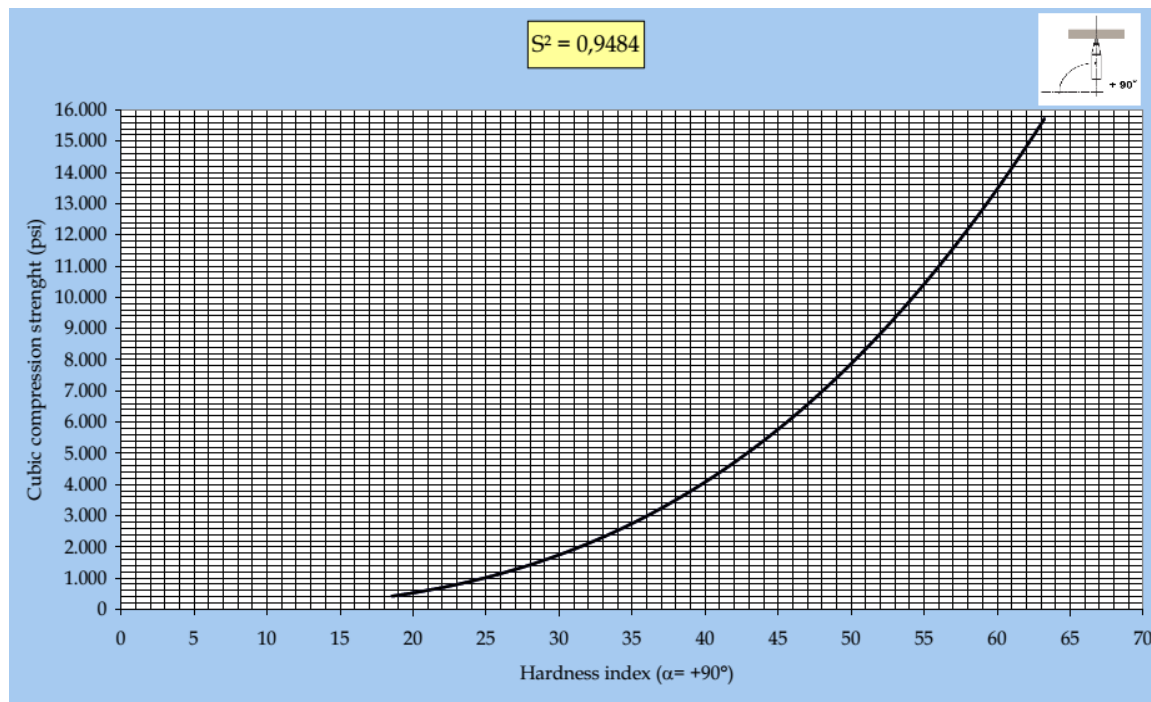
MpA - Angle + 90°

$S^2 = 0,9484$
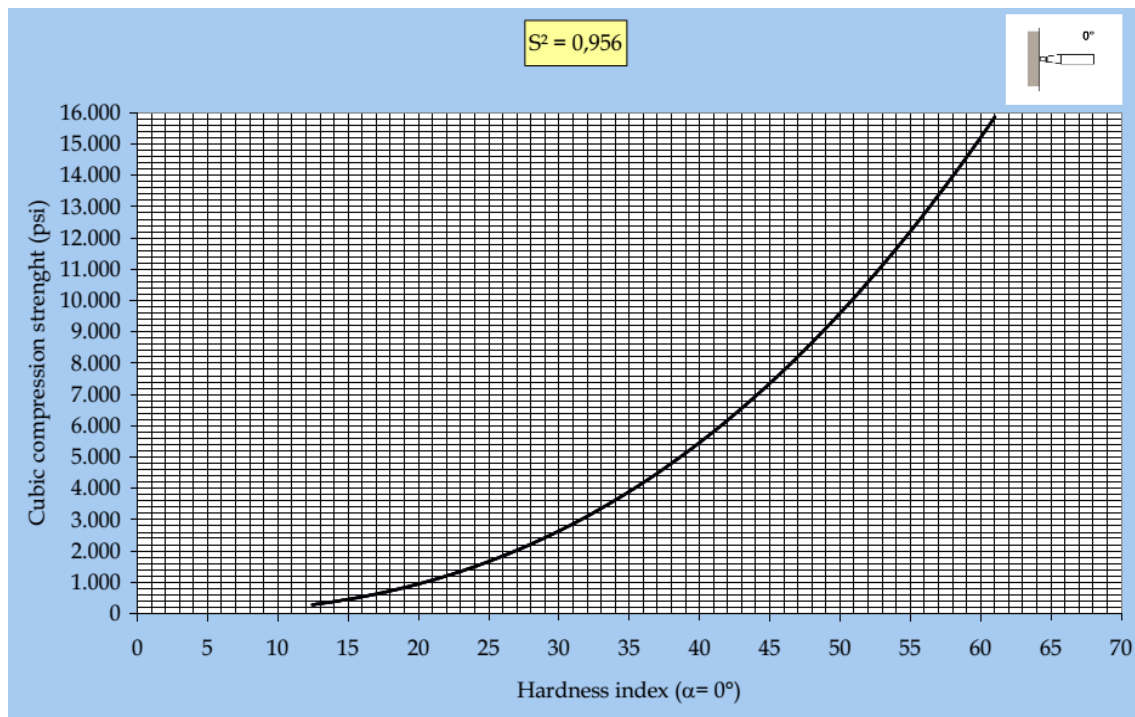
MpA - Angle 0°

$S^2 = 0,956$
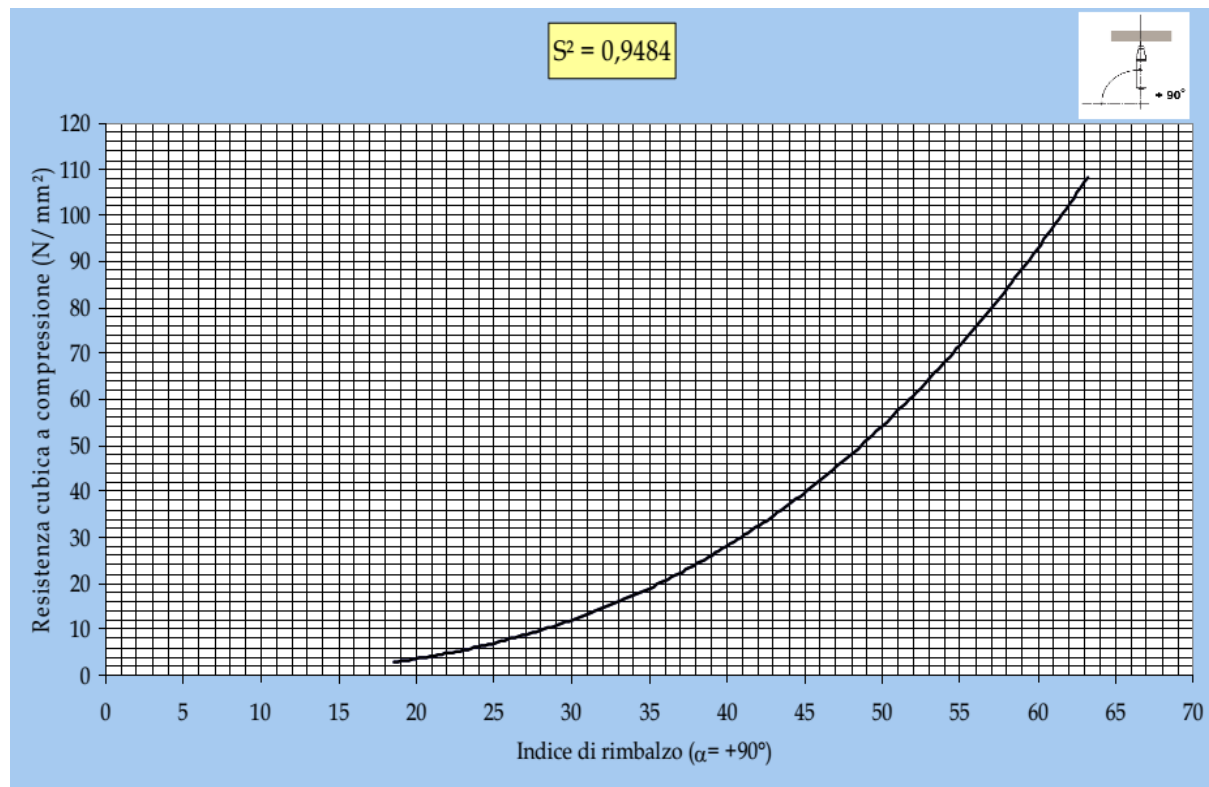
MpA - Angle - 90°

PSI - Angle + 90°

PSI - Angle 0°

$S^2 = 0,956$

Cubic compression strenght (psi) vs Hardness index ($\alpha = 0°$)

PSI - Angle - 90°
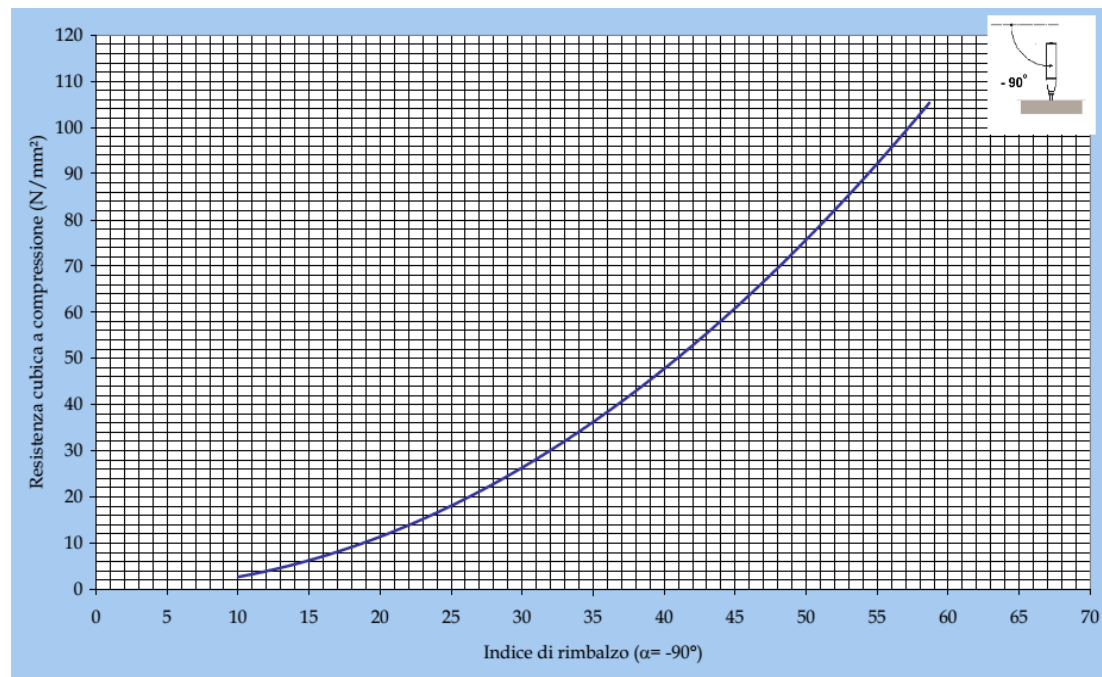
Accessories
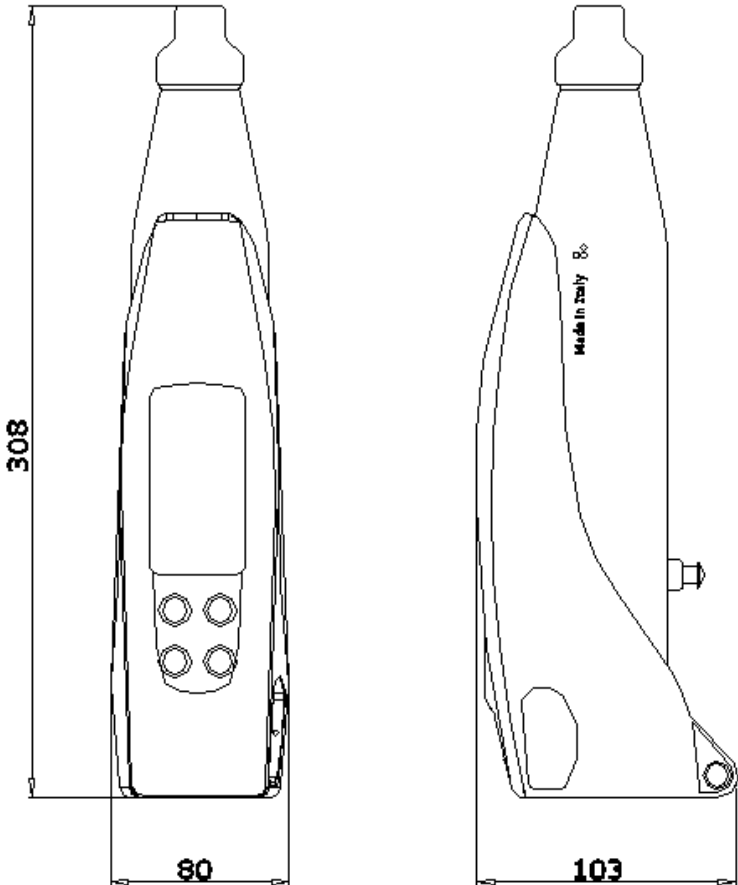
Accessories

ECTHA PRO is supply with below configuration:

Ectha PRO

w   Concrete Test Hammer ECTHA PRO
w   Measurement sample
w   Fenolftaleina
w   Abrasion stone
w   Rechargeable battery
w   USB external battery
w   Soft bag
w   Software PC ECTHA W
w   APP ECTHA-R*

*La APP ECTHA-R is available on google play

Technical info

Technical data

Performance
w   Measure Range: 5-120 N/mm2
w   Impact energy: 2,207 Nm
w   Limit thickness range: Thickness > 100mm
Mechanical
w   Case : aluminum Lega 6060 - 11S
w   Surface : Aluminium oxide
w   Impact mass: INOX 303
w   Handle : Plastic ABS-Nylon
Physical
w   Dimension: 308 x 80 x 103
w   Weight: 1,5 Kg
w   Gross weight : 4,4 Kg (shipping weight)
w   Package dimension : 420 x 280 x 180 mm
     (shipping dimension)
w   **Electrical**
w   PCB board: Intel processor
w   Display: colours 64x128
w   Battery: 10h
w   Interface: USB
w   Memory: Mini SD 2Gb
w   Blue Tooth 4.0

Explosion view

Explosion view
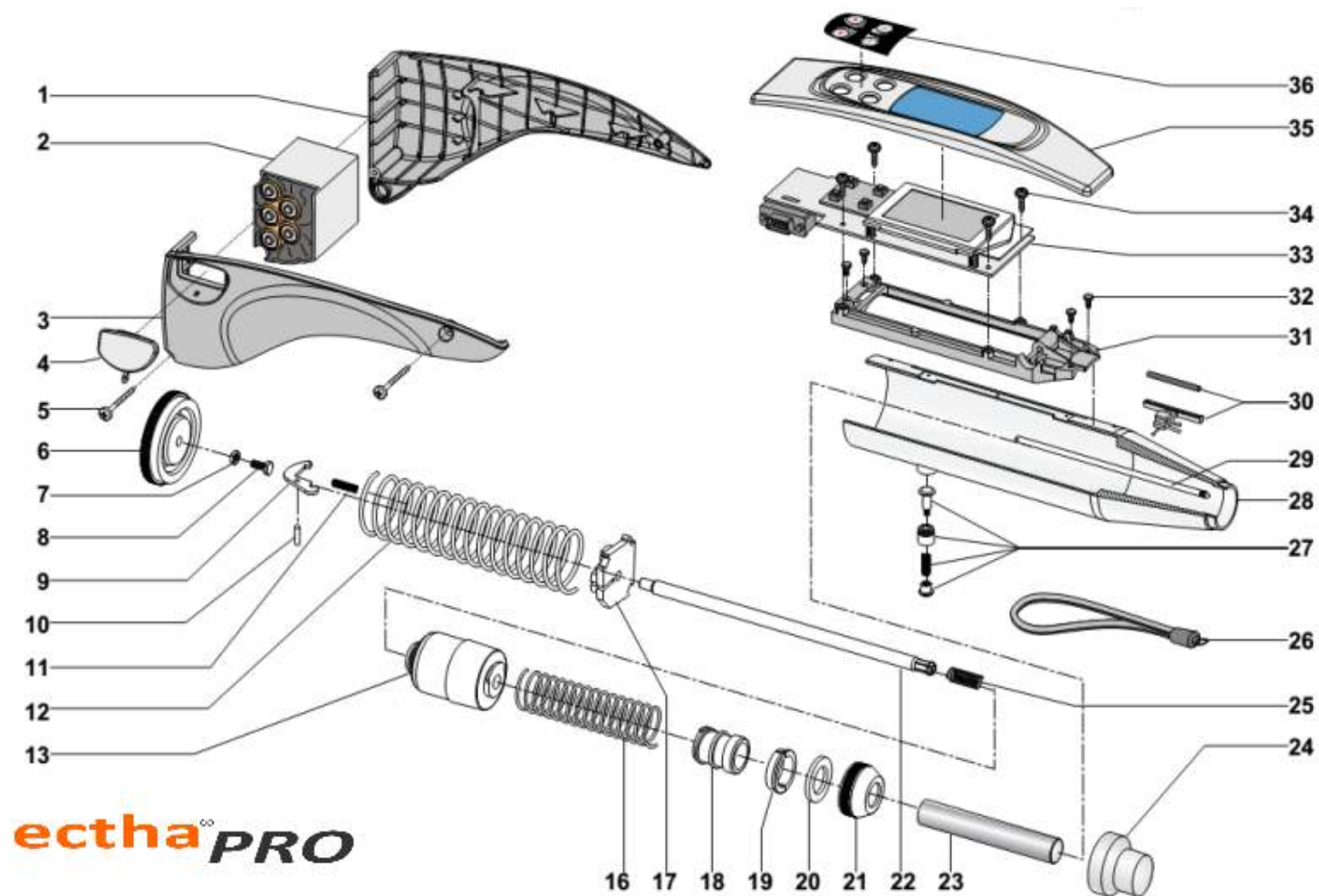
Part List

Pos	Codice	Descrizione	Pos	Codice	Descrizione
1	01.DRC.0092	left side shell	19	01.TRE.0114	block segment
2	01.DRC.0091	batteries	20	01.DRC.0070	washer
3	01.DRC.0093	right side shell	21	01.TRE.0103	push rod
4	01.DRC.0089	USB cap	22	01.TRE.0111	sliding beam
5	01.DRC.0094	Screw TCTC 35x42	23	01.TRE.0109	percussion beam
6	01.TRE.0104	rear cap	24	01.TRE.0116	transport cap
7	01.DRC.0076	Nut M6	25	01.ADR.0001	spring
8	01.DRC.0075	Screw TCE M6x14	26	01.DRC.0074	belt
9	01.OMP.0001	Hook	27	01.TRE.0107*	push button
10	01.TRE.0115	pin hook	28	01.DRC:0098	aluminum shell
11	01.ADR.0004	spring hook	29	01.TRE.0113	index rod
12	01.ADR.0002	back spring	30	01.DRC.0097	cursor
13	01.TRE.0110	hammer	31-32	01.DRC.0096	PCB fixing base
16	01.ADR.0005	hammer spring	33-34	01.DRC.0090	PCB board
17	01.TRE.0108	hammer support	35	01.DRC.0084	top shell
18	01.TRE.0101	support for percussion spring	36	01.DRC.0107	keyboard

Video instruction

Video Instruction

Ectha PRO

Ectha PRO Vs ECTHA-R App

Remove transport cup

Calibration check

Testing area

How to set testing area

Performing test